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P. PENSABENE, E. GASPARINI (eds.)

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## Abstract

*The Roman province of Lusitania was the last mainland of the Iberian Peninsula in the process of Romanization. The use of marble in this territory, from the Augustan times until the gradual fall of the Roman Empire, is evaluated as one of the cultural and economic phenomena developed by Rome. Throughout over four centuries of Roman history, this territory was immersed in a series of changes related with this complex process that can be associated with the different use of marble.*

*The identification of the marble source used in arts and architecture provides valuable information on trading patterns and local or imported workshops. Only the combination of analytical techniques applied to the study of white marbles facilitates the contextualization of those imported for archaeological pieces found in a territory where local marbles are of outstanding excellent quality.*

## Keywords

Lusitania, *Augusta Emerita*, Estremoz Anticline marbles

## Introduction and aim

Lusitania, the Roman province of created by Augustus after the Cantabrian wars, was the last mainland of the Iberian Peninsula in the process of Romanization. Its Capital, *Augusta Emerita* (modern Mérida, Spain) was founded in 25 BC as a settlement for troops discharged from the Legions V and X. It was entirely designed as an example of Roman urbanization beside the Guadiana River.

Throughout time, this Colony became one of the most important cities in Hispania: an economic and cultural center whose artistic and architectural concepts served as models for the emergent new towns. It maintained its prosperous position beyond the time of the fall of the Roman Empire (NOGALES BASARRATE, 2003, 2004).

In this part of Hispania, the development of using marble in architecture and arts was a complex process, as

there was no previous tradition in its exploitation and manufacture, despite being a territory with extensive marble outcrops. The native pre-Roman buildings and decorative pieces were based primarily on local stones such as granite or limestone, as well as other complementary materials. The few artistic manifestations found represent symbolic and schematic forms or some anthropomorphic pieces of Celtic influx, in which marble was absent (NOGALES *et al.*, 2008). The native towns had not monumental value and nor did their infrastructures require a building strategy, as the new Roman culture needed. The Italic inhabitants brought assimilated other traditions in urban planning and town decoration which were reflected in their houses and public buildings (NOGALES BASARRATE, 2007a, 2009a, 2011). By contrast, at that time, the communities of the South of Hispania (*Baetica* province) or on the Eastern Mediterranean coast (*Tarraconensis* province), had already developed a Roman urban culture and a classic type “visual language” of in which marble would also have a broad application and played a leading role in the decorative schemes especially during and after the Augustan period.

The main object of this paper is to show the significance of local marble as a material associated with the Romanization of the SW territory of Hispania. This is based on the archaeometric studies carried out on different Lusitanian pieces dated from the end of the 1<sup>st</sup> century BC to the end of the 4<sup>th</sup> century AD. The analytical results published elsewhere (LAPUENTE *et al.*, 1999, 2000, 2014; ROYO *et al.*, 2011) point to the massive use of local marbles but also some imported classical marbles were attested in several symbolic pieces of different decorative programmes.

Another purpose is to claim the importance of applying a multi-method approach to identify the local marbles whose physical and compositional features are similar to some classical ones, such as the fine grained marbles of Luni-Carrara, Pentelikon and Dokimeion.

1. Museo Nacional de Arte Romano, José Ramón Mérida, s/n, 06800 Mérida, Spain. trinidad.nogales@mecd.es

2. Petrology and Geochemistry, Earth Sciences Dpt., Zaragoza University, Pedro Cerbuna, 12, 50009 Zaragoza, Spain. plapuent@unizar.es, hroyopl@unizar.es

3. Unitat d'Estudis Arqueomètrics, Institut Català d'Arqueologia Clàssica (ICAC), Pl. Rovellat, s/n, 43003, Tarragona, Spain. hroyo@icac.cat

4. Scienze della Terra Dpt., Università “La Sapienza”, Piazzale Aldo Moro, 5, 00185 Rome, Italy. maria.preitemartinez@uniroma1.it



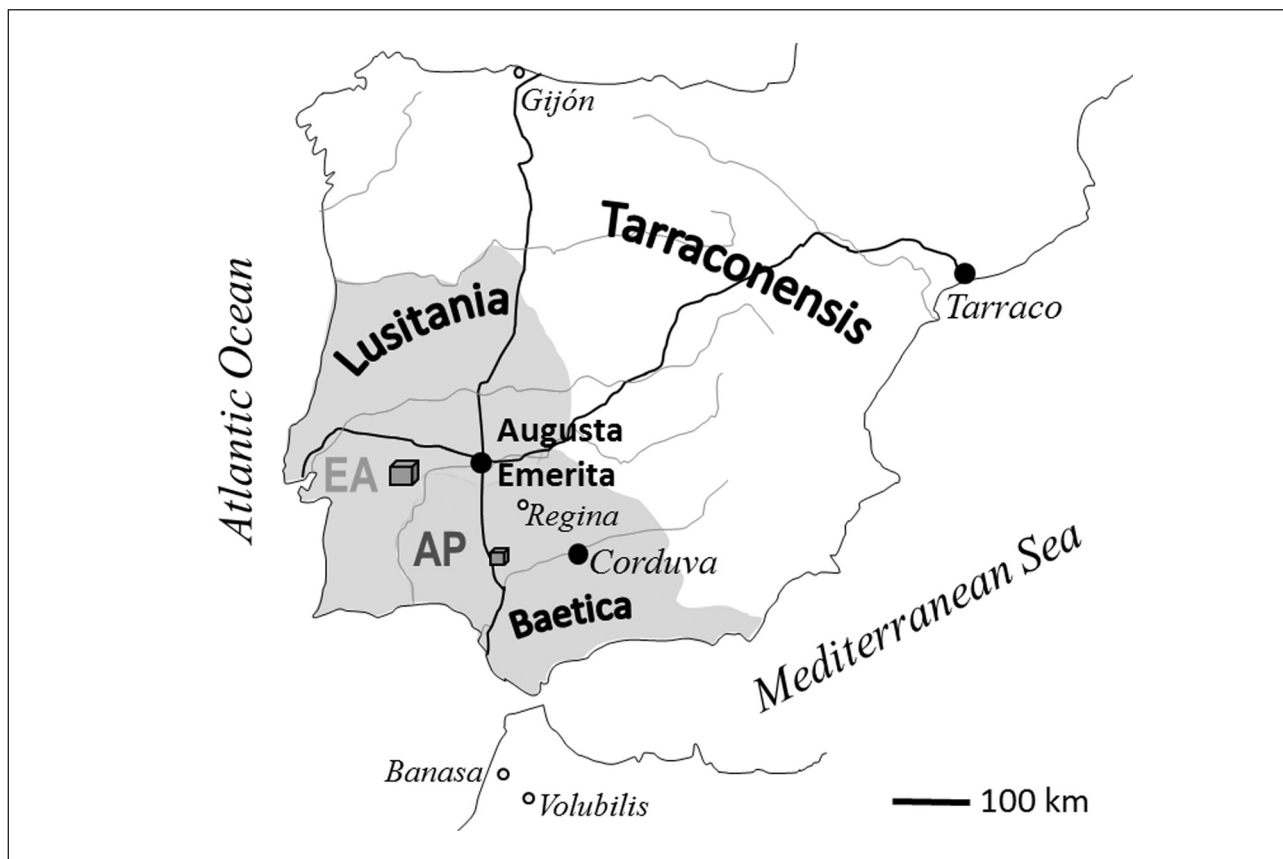


Fig. 1. Geographical setting of *Augusta Emerita*, capital of Roman Lusitania, the Estremoz Anticline (EA) and the Almadén de la Plata (AP) marble districts. Location on the archaeological sites cited in the text are given.

#### Local marbles: the Estremoz Anticline (EA) and Almadén de la Plata (AP) marbles

Two main source marble areas were widely exploited by the Romans in the SW part of Hispania were the Estremoz Anticline (EA) and the Almadén de la Plata (AP) marbles (Fig.1). Both are located in the same geological unit, the Ossa Morena Zone of the Iberian Massif, but in different Roman administrative provinces, *Lusitania*<sup>1</sup> and *Baetica*, respectively (NOGALES & BELTRÁN, 2008).

The EA, one of the Variscan macrostructures of the Ossa Morena Zone, is located in the Alto Alentejo province of Portugal, next to the ancient *Ebora* and about 110 km west of *Augusta Emerita*. It consists of a Paleozoic elongated NW-SE trending structure, approximately 40 km long and 5-7 km wide. The current 400 marble quarries are concentrated near the localities of Borba, Vila Viçosa, Pardais, Bencatel and Estremoz. Some evidence of ancient extraction is still visible in this area (MAÑAS & FUSCO, 2008; NOGALES *et al.*, 2008). Marble samples of our database (LAPUENTE & TURI, 1995; LAPUENTE *et al.*, 2000; ÀLVAREZ *et al.*, 2009; LAPUENTE *et al.*, 2014) were collected along the anticline,

preferentially in its southern part, closer to the location of *Augusta Emerita*. In spite of the fact that some physical and/or compositional “finger prints” can be established in the marbles of each locality, the intra-quarry variability attested and the minimal differences found in marbles from different EA quarries, makes it more reasonable to consider them, all together, as just one unique reference group.

From the stratigraphic point of view, the EA has a Precambrian detrital basement, a Lower Cambrian “Estremoz Dolomitic Formation”, a thick sequence of Cambrian-Ordovician “Estremoz volcano-sedimentary carbonate Complex” (with marbles and calc-schists) and Silurian detrital deposits (OLIVEIRA *et al.*, 1991; Carvalho *et al.*, 2008; Lamberto & Sá Caetano, 2008).

The light-coloured varieties, white and cream marbles, are found throughout the entire Complex. Greyish to pink-reddish coloured streaks are locally frequent. The pink marbles, currently the most commercial materials, are associated with veined varieties interlayered with green metavolcanic rocks. Grey and dark grey marbles occur either as lenses in the light-coloured unit or in more continuous levels at the top of the carbonate se-

1. Other local marble quarries in *Lusitania*, as Trigaches and Viana do Alentejo supplied raw materials in Roman times for local markets.

quence. For statuary, the Romans selected the light coloured varieties which show a wide range of qualities from fine, medium to coarse grained.

Analogous Early Paleozoic lithostratigraphic sequences are distributed over various areas of the Ossa Morena Zone. One of these is the tectono-metamorphic terrane known as “Almadén de la Plata Core” (ABALOS *et al.*, 1991), located at the southern border right where the Ossa Morena Zone meets the South Portuguese Zone. Several ancient marble quarries were identified along the Sierra Los Covachos (BELTRÁN *et al.*, 2011; Rodríguez *et al.*, 2012), close to the Almadén de la Plata location. These AP marbles show similar colours and varieties to those from the EA district. Both marbles, derived from comparable Cambrian-Ordovician carbonate sequences with intercalated volcanic rocks, were subject to a complex structural tectono-metamorphic evolution with progressive and continuous deformation associated to shear zones. As a consequence of the specific location on the tectonic southern boundary of the Ossa Morena Zone, the AP marbles underwent locally intensive ductile deformation with syntectonic recrystallization, while in the EA marbles, the shear zones occur discretely. Detailed information on AP marbles, regarding their petrographic varieties was reported by Ontiveros *et al.* (2012).

CL-patterns facilitate to identify the Iberian marbles. The presence of CL zoned calcite that appears to be a single uniform crystal under polarized light, and / or dark cores with clear overgrowths helps to discriminate the EA marble sources from the AP marbles. Regarding CL intensity, the EA marbles show faint, medium or moderately strong luminescence, while the AP marbles and also other quarry marbles of the Ossa Morena Zone like Viana do Alentejo, manifest a strong to very strong orange intensity under optical CL microscopy.

A complete revision of the best mineralogical-petrographic and CL parameters for their discrimination including an updated isotopic diagram has been recently published (LAPUENTE *et al.*, 2014) and checked on archaeological pieces from *Banasa*, in Morocco (ANTONELLI *et al.*, 2014).

Comparing the Iberian marbles with the classical ones, the fine grained EA marbles show mineralogical-petrographic features with an extremely variable microstructure which could be misunderstood in some cases with Luni-Carrara, with Pentelikon or even with Docimian marbles. The homeoblastic textures look like some atypical Carrara varieties, but the slightly heteroblastic, some with oriented crystals to foliated fabric, seem to be a Pentelic marble, reinforced by the presence of small flakes of muscovite. On the other hand, the highly stressed microstructures could be mistaken for those exhibited by the Docimian marbles. The isotopic signature serves to discriminate the EA marbles from Luni-Carrara, but not from Pentelikon or Dokimeion (LAPUENTE *et al.*, 2000; 2014). In many cases, optical CL images, help to discriminate the Iberian EA and AP marbles from the imported ones.

Most of the medium and coarse grained

(MGS>2mm) marbles of the EA district are homeoblastic, but occasionally are heteroblastic, even showing evidence of stressed processes similar to those shown by the AP marbles, from which the combination of isotopes and CL facilitate their identification. An additional parameter which seems to be useful is the value of  $^{13}\text{C}$ , since, after the archaeometric study of the most emblematic statuary pieces found in the Lusitanian territory, those of coarse grained samples attributed to the EA district manifest an isotopic signature with  $^{13}\text{C}<1,5\%$  (Fig. 2).

### Marble source of Lusitanian archaeological pieces

Global considerations are exposed here based on the results of marble provenance analyzed from several archaeological sites of the Lusitanian province (LAPUENTE *et al.*, 1999, 2000, 2014; Royo *et al.*, 2011). With special emphasis on verifying the massive local EA origin, a representative record of white archaeological pieces from the Augustan period to the 4<sup>th</sup> century AD was selected for archaeometric studies. Most of them are exhibited at the National Museum of Roman Art in Mérida (Spain) where the sculpture collections are an essential set to understanding the introduction and use of marble in the West of Roman Hispania. In this study, different statuary and decorative architectural pieces were chosen as representatives of the major public buildings of *Augusta Emerita*. The Theatre of the provincial Capital is one of the monuments with better known chronology evidenced by epigraphy (NOGALES BASARRATE, 2007a, b). Its opening dates back to the early colonial decades (16-15 BC), though it underwent diverse phases of decoration (TRILLMICH, 2004) until its final stages in Constantine times (NOGALES BASARRATE, 2013). From this monument, white local marbles from the EA district and imported ones from Luni-Carrara and Paros-1 *Lychnites* were identified. Coloured EA marbles and local limestones served to pave the *orchestra* and enormous columns of dark grey veined marbles from the Pardais location decorate its *frons scaenae* (NOGALES BASARRATE, 2003).

The Colonial *Forum* combines the use of local stone materials with statuary marble, mostly from the local EA district (ÁLVAREZ & NOGALES, 2003). Some pieces originally from the same emplacement, but reused in the 4<sup>th</sup> century AD, to build the Monument to Santa Eulalia martyr, were also assigned to the EA marbles. From the so-called Temple of Diana, or imperial cult Temple, the selected samples range in chronology from the first years of the Colony till well into the 1<sup>st</sup> century AD. Two analysed Male *Togati* though similar in design, were assigned to different original marble sources, a local EA marble and a Luni-Carrara origin.

One of the fragments representing colossal heads, interpreted as part of a commemorative trophy from the wars against Cantabrians and Astures and which could therefore be representative of the early times of the Colony, was also carved on EA marble.

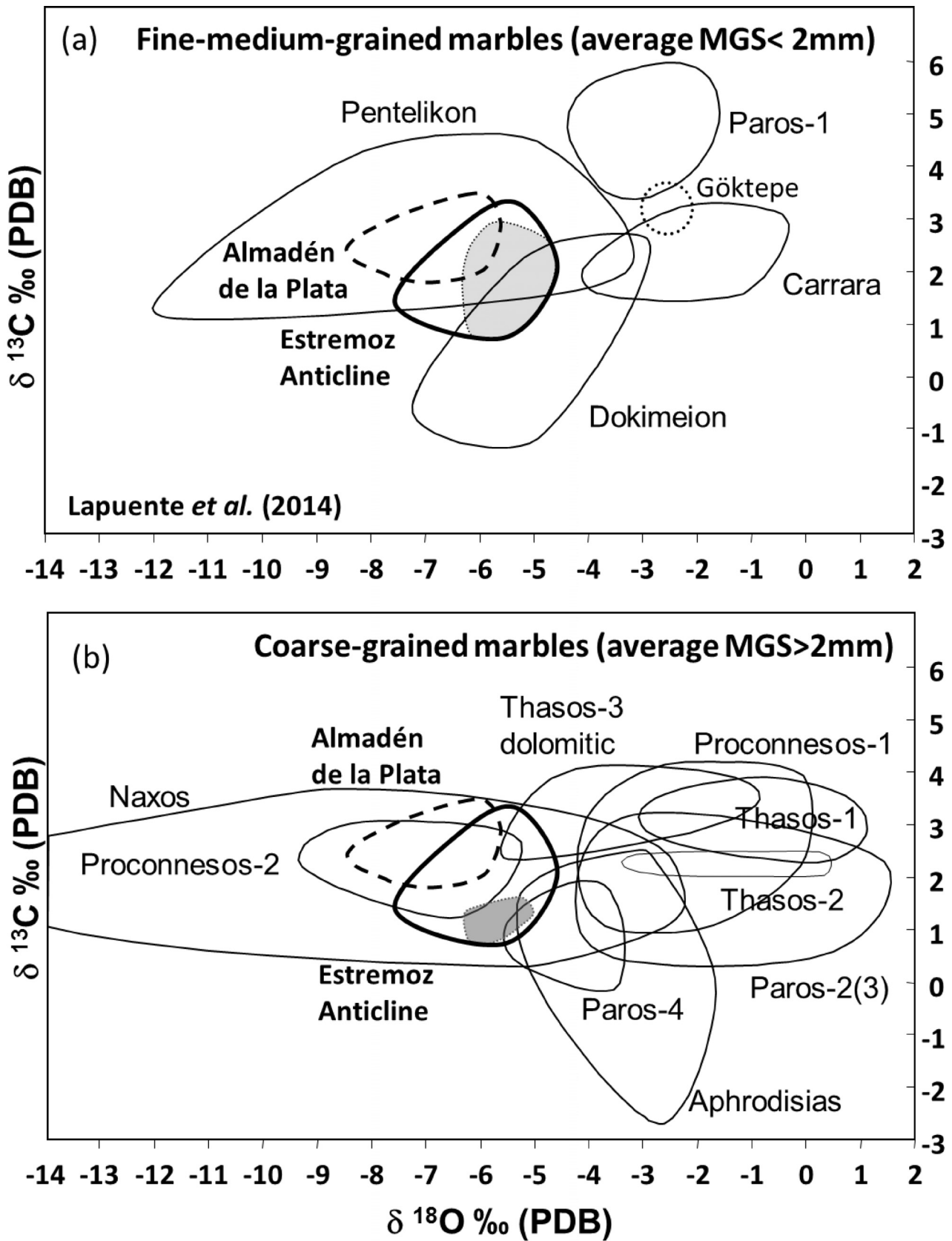


Fig. 2. Updated isotopic signature of the Iberian white marbles from the Estremoz Anticline and Almadén de la Plata districts, in the general isotopic diagrams according to Gorgoni *et al.* (2002). (a) In the diagram for fine and medium grained marbles, the grey area represents the isotopic field of the archaeological samples assigned to EA marble source in Lapiente *et al.* (2014). The dotted line is the isotopic field of the archaeological samples attributed to the Göktepe samples after Attanasio *et al.* (2013). (b) In the diagram for coarse grained marbles, the dark grey area covers the isotopic signature of the archaeological samples assigned to the EA marble source in Lapiente *et al.* (2014).

By the Tiberian period and following the Roman model of the metropolitan Temple of Concord, the *Provincial Forum* was built entirely of marble, from which several emblematic pieces were analysed, most of them recognized as marbles from the EA district.

The same local marbles, in different varieties, were attested in the representative sculptures from the *Mithraeum* House, dated from around mid 2<sup>nd</sup> century AD, and dedicated to mythological cycles around *Mithra* and the Pantheon of Oriental gods. One sculpture of this collection the so-called *Esculapius* was carved from Aphrodisian marble.

Local analysed EA marble was used in the skilfully decorative lintel from the “Temple of Mars”, dated to the second half of the 2<sup>nd</sup> century AD, based on stylistic criteria which followed designs which were common at that time in Rome.

Another statuary group on imported white marble was found in the Roman *villa* of Quinta das Longas, located at São Vicente e Ventosa (Elvas, Portugal), ascribed to the *conventus emeritensis*. This exceptional group dated from the 4<sup>th</sup> century AD was composed of a large number of fragments of extremely fine grained white marble assigned to the quarries of Göktepe, in Asia Minor (NOGALES BASARRATE, 2013).

### Considerations on the use of stones in Lusitania throughout time

It is well-known that during the pre-Roman period, there was no tradition regarding the use of certain stone materials, like marble, which was unknown to the native people of Lusitania. Despite living in a territory with an abundance of marbles, the inhabitants used local granites and limestones. The lack of knowledge of the properties of marble by the locals, did not deter them from responding immediately to the development of the new lands, in an urban building process intended to provide a Roman image.

During the Augustan period when the process of conquest and the provincial development had finished, a first stage is documented all over the Lusitanian territory based on the use of local granites and limestones with architectural purposes. Granite elements were employed for a large part of the infrastructures and also for ornamental architecture, covered with fine stucco whose appearance was intended to simulate marble. This practice is noted in *Augusta Emerita*, among other buildings, in the first stage of the Theatre and in the Temple of Diana where some granite elements were also decorated with bronze pieces. Marbles were introduced as decorative elements used with granite, as evidenced in the Temple Forum of *Ebora*, bases and capitals were made with marble, but other elements (podiums, shaft pieces, architraves and cornices) were granite. This detail evidences the availability of the first local marble workshops to highlight certain ornamental pieces of the Temple. However, marble did not become popular until

Rome was fully implemented at the very beginning of the 1<sup>st</sup> century AD (NOGALES *et al.*, 2008).

The constructive demand of the first Romanization moments of Lusitania imposed the considerable use of local granite (NOGALES *et al.*, 1999), an excellent material for large public buildings, reserving marble for the incipient statuary production, since local limestone, even with stucco, was not of sufficient quality for carving. Marble became popular with the first settlers. Presumably their portraits were early works in local marble, as attests by the important collection in the National Museum of Roman Art attributed to the end of the 1<sup>st</sup> century BC. In the series of *Emeritensis* portraits of Republican tradition, the same Italic works schemes can be observed. This parallel style shows that the first portrait workshops came at *Augusta Emerita* with the first settlers. These were the Italic people who knew so well how to work marble.

The marbles used were mostly local, particularly those of the EA quarries, but alternated with ornamental limestone and products of imported marbles for some exceptional works.

The regular exploitation of the EA marble quarries would have started sometime in the 1<sup>st</sup> century AD. In its early years, the emergent political and administrative position of *Augusta Emerita* played a decisive role, where the exploitation and control of quarries and mines would not be effective until the full consolidation of the province, in the presence of the Governor as a supervisor of the economic transactions. Some decades later, local marble quarries began massive exploitation to provide the needs imposed by the large provincial public monuments. In this sense, during the Julio-Claudian age, and as a result of the monumentalization process, this brought about a high demand for marbles. At that time, the introduction of the imperial cult also influenced the workshop specialization. As a material associated with Romanization, marble was used in the course of the first centuries of the Empire, as a vital factor for political propaganda, especially through the statuary images (ÁLVAREZ & NOGALES, 2003; Nogales-Basarrate 2003, 2009b, 2011, Nogales *et al.*, 2008).

Throughout this second stage, or “period of marmorization”, two main factors influenced the massive use of local EA marbles. On the one hand, the geographic situation of the Lusitanian territory, especially the inland location of its capital and, on the other, the local occurrence of abundant high-quality marbles. *Augusta Emerita* was located about 300 km inland at a strategic intersection between two main roads. Fluvial routes, however, were only partially navigable. The so called “Pulo do Lobo” waterfall on the Guadiana River impedes direct fluvial access to the Atlantic Ocean. Both factors could have lessened the trading of imported marbles, contrary to other Hispanic capitals such as Tarraco. In this context, the most emblematic pieces of large official programmes could be imported directly from Rome, especially those could constituted singular models to be copied by the provincial workshops. Also, the technical quality of the EA marbles, particularly the with finer grained types,



Fig. 3. Detail of *Aeneas* displayed at the National Museum of Roman Art in Mérida (ref. MNAR 33676). The piece from the Forum of the *Coloniae of Augusta Emerita*, was finely carved in marble from the Estremoz Antidine district.

comparable to classical marbles, made it possible to perform elaborate carving works (Fig. 3). Roman sculpture workshops, adapted to local marbles right from the beginning. They began the process of training the provincial craftsmen, in the use of marble and obtaining works of great quality with local EA marbles. Only the archaeometric study facilitates the identification of statues that could be a model and a copy (imported-local), but whose artistic performance is similar (Fig. 4).

Throughout the 1<sup>st</sup> to 3<sup>rd</sup> centuries, marble was the material by excellence, extending the use of EA marbles in different decorative programmes, as illustrated by certain examples like ornamental architectural pieces (Temple of Mars) and sculptures from the house of the Mithraeum.

By that time, the whole Lusitanian province was supplied with EA marbles for statuary, decorative-architectural elements and epigraphy (NOGALES *et al.*, 1999, 2008; Lapuente *et al.*, 2000; Mañas & Fusco, 2008; Álvarez *et al.*, 2009; Taelman *et al.*, 2013). Their products spread, at least, to points as far up as Gijón in the north of Hispania (VIDAL & GARCÍA-ENTERO, in this volume) and down to Volubilis (Morocco) in the Mauritania province (ANTONELLI *et al.*, 2009).

It seems that in the *Baetica* province, with a few exceptions, the existence of other quarries, like AP marbles, made trade entered in competition. Though almost equidistant from Augusta Emerita, the AP marbles (about 140km to the south) were not so widely used in this Colony, perhaps the administrative differences in both provinces influenced in their scarce mutual intertrading. An exception is found in the analyzed archaeological pieces from *Regina Turdulorum* (ROYO *et al.*, 2010), located in the *Baetican* province, but not far from *Augusta Emerita* (Fig.1). The archaeometric analyses attested the use of marbles from the EA district, in spite of being closer to the AP marble district.

The predominance of the EA marbles has been confirmed by a multi-method approach applied to a selec-

tion of Lusitanian pieces, but for certain exceptional works, imported marbles were also employed. This is the case of some pieces found in the so-called *aula sacra* of the peristyle of the Theatre of Augusta Emerita. They are Augustus, Tiberius and a young Julio-Claudian *Princeps*, marble statues sculpted by parts, heads and bodies. The exceptional head of Augustus *capite velato*, perhaps the oldest imperial portrait found in Mérida, was carved in Luni-Carrara marble (LAPUENTE *et al.*, 1999), which is an official imperial cult portrait imported directly from Rome and sculptured by a metropolitan workshop (NOGALES BASARRATE, 2007a).

Different quality in the finished works can be also inferred from the “series” of sculptures, as is the case of the *togatus* (Fig. 5), made from local marbles by less qualified hands in the work of sculpturing marble (TRILLMICH, 2006). By contrast, in some examples, the identification of which one was carved in local or in imported marble, can be made only after the results of the archaeometric analyses, as both pieces are almost identical in design (Fig. 4) This also occurs in the thoracata pieces, from three analysed pieces, two were carved from *lychnites* marble (Paros-1), but one was made with local EA marble (Fig. 6).

A singular space by its decorative and constructive style is the so-called “*Porticus of Forum Coloniae*”, defined as a possible space destined for the Augustan dynastic exaltation. This site developed a dense decorative program modelled following the *Forum of Augustus*, in Rome. Its parallelism was so close that often it has been though in an *officina* of this project related to Rome itself (NOGALES BASARRATE, 2007a). However most of the marbles used were from a local EA source.

The identification of the white Göktepe marble from Turkey, recognized in a rich program of the 4<sup>th</sup> century AD, a statuary program associated with the ornamentation of a *nymphaeum* found at the *villae* of Quinta da Longas is an example of how the emerged private properties of a select provincial clientele were richly decorated with material and in the style of the oriental influence of the Aphrodisian workshops (NOGALES BASARRATE, 2009a, 2013).

Finally, the gradual fall of the Roman political system meant, among other consequences, the slow transformation of the urban image with the progressive difficulty in exploiting quarries, which resulted in a new direction in the use and reuse of stone materials.

## Concluding remarks

Being originally from the same geological unit, the EA and AP local marbles show visual similarities in colour, have comparable macro and microstructures and share compositional characteristics. Therefore their identification cannot be made only by means of a visual characterization alone, nor is it enough using only petrographic criteria. However the CL behavior joint to the



Fig. 4. Two Male *Togati* from the Temple of Diana. Though they were carved from different material, a local and an imported marble, respectively, both were the work of expert artists.



Fig. 5. Two Male *Togati* from the *Forum Coloniae*. Both were carved from the same marble of the Estremoz Anticlinal district, but have a different finished result.

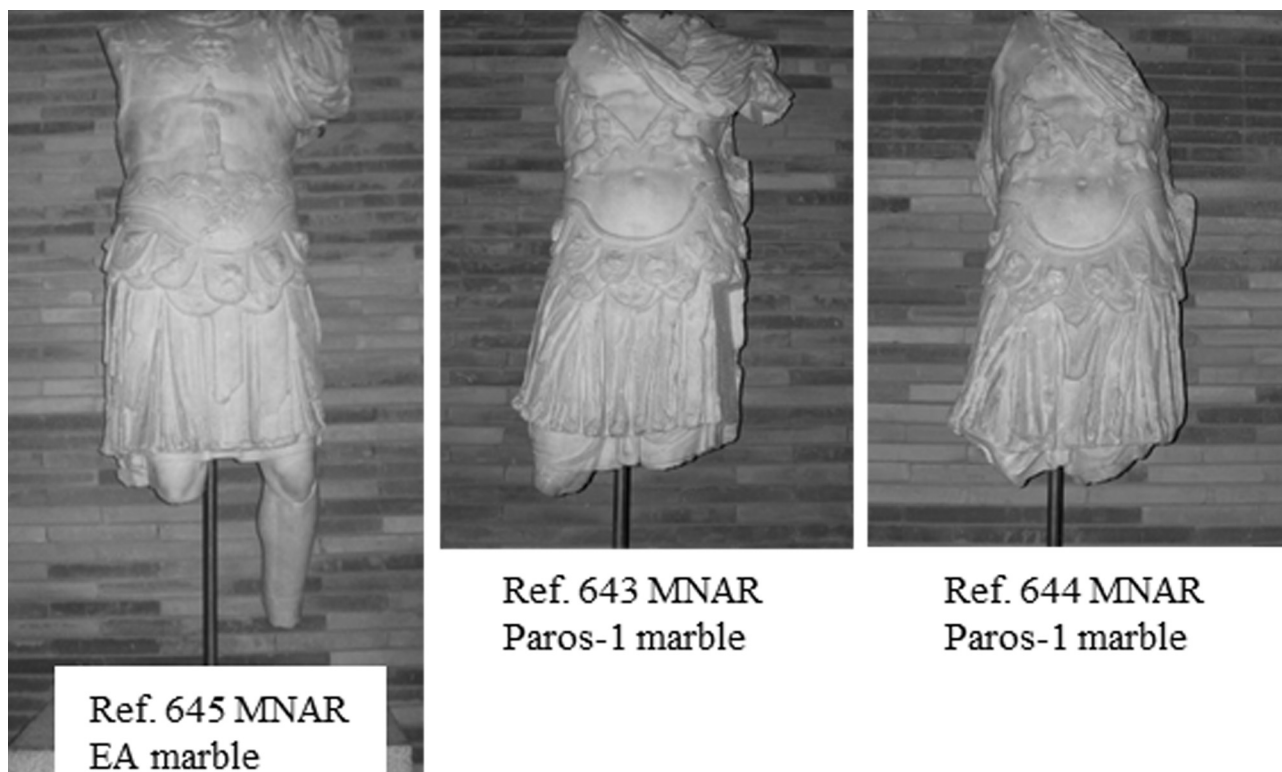


Fig. 6. In this "series" of Thoracata Emperor from the *scaenae frons* of the Theatre of *Augusta Emerita*, only the archaeometric analyses reveals which was a local marble and which were imported. In this case, the high quality of the local Estremoz Anticline marble allowed the skillful artist to achieve an excellent result, following the style of the other pieces carved in marble from the island of Paros (*lychnites*).

isotopic signature make them easier to recognize (LAPUENTE *et al.*, 2014).

A chronological analysis of the marble use in Lusitania from the end of the 1<sup>st</sup> century BC to the end of the 4<sup>th</sup> century AD and the role of *Augusta Emerita* as a diffusion centre for artistic models have been shown. The analytical results not only confirm the predominance of the local EA marbles but also point to a variety of marble quarry sources imported from Luni-Carrara, Greece and Asia Minor. The results have facilitated the contextualization of the imported pieces in a territory where local marbles competed in quality. On the one hand, the presence of Italian models, both in architectural decoration and in public and private works using local marble and, on the other the relationship between *Augusta Emerita* and the workshops of Rome, have been highlighted from the Colony's origins to the 2<sup>nd</sup> century AD.

In the 3<sup>rd</sup> and 4<sup>th</sup> centuries AD when public sculptural programmes were being completed, new patterns arrived from Rome and the provinces. Finally, in the 5<sup>th</sup> century AD many Roman public works fell into disuse and the sculptural workshops were closed down, which marked the end of the sculptural language of the new Christian Empire.

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